भारतीय मानक ब्यूरो

(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)

BUREAU OF INDIAN STANDARDS

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व्यापक परिचालन मसौदा

हमारा संदर्भ : सीईडी 02:1/टी-16 **04 सितंबर 2024**

तकनीकी समिति : सीमेंट और कंक्रीट अनुभागीय समिति , सीईडी 02

प्राप्तकर्ता :

1. **सिविल अभियांत्रिकी विभाग परिषद, सीईडीसी के सभी सदस्य**
2. **सीमेंट और कंक्रीट अनुभागीय समिति , सीईडी 02**
3. **सीईडी 02 की उपसमितियों और अन्य कार्यदल के सभी सदस्य**
4. **रुचि रखने वाले अन्य निकाय।**

महोदय/महोदया,

निम्नलिखित मानक का मसौदा संलग्न है:

प्रलेख संख्या	शीर्षक
सीईडी 02(26500)WC	**अतिसल्फेट कृत सीमेंट — विशिष्टि** (IS 6909 का दूसरा पुनरीक्षण) का भारतीय मानक मसौदा (आई सी एस संख्या : 01.040.91)

कृपया इस मसौदे का अवलोकन करें और अपनी सम्मतियाँ यह बताते हुए भेजे कि यह मसौदा प्रकाशित हो तो इन पर अमल करने में आपको व्यवसाय अथवा कारोबार में क्या कठिनाइयां आ सकती हैं।

सम्मतियाँ भेजने की अंतिम तिथि: 31 अक्टूबर 2024

सम्मति यदि कोई हो तो कृपया अधोहस्ताक्षरी को ई-मेल द्वारा ced2@bis.gov.in पर या उपरलिखित पते पर, संलग्न फोर्मेट में भेजें। सम्मतियाँ बीआईएस ई-गवर्नेंस पोर्टल, www.manakonline.in के माध्यम से ऑनलाइन भी भेजी जा सकती हैं।

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यह प्रालेख भारतीय मानक ब्यूरो की वेबसाइट www.bis.gov.in पर भी उपलब्ध हैं।

धन्यवाद।

भवदीय
ह-/
द्वैपायन भद्र
वैज्ञानिक ई एवं प्रमुख
सिविल अभियांत्रिकी विभाग

संलग्न: उपरलिखित

भारतीय मानक ब्यूरो
(उपभोक्ता मामले, खाद्य एवं सार्वजनिक वितरण मंत्रालय, भारत सरकार)
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Phones: 23230131 / 2323375 / 23239402

WIDE CIRCULATION DRAFT

Our Reference: CED 02:1/T-16 **04 September 2024**

TECHNICAL COMMITTEE: CEMENT AND CONCRETE SECTIONAL COMMITTEE, CED 02

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Cement and Concrete Sectional Committee, CED 02
3. All Members of Subcommittees, Panels and Working Groups under CED 02
4. All others interested.

Dear Sir/Madam,

Please find enclosed the following draft:

Doc No.	Title
CED 02(26500)WC	**Draft Indian Standard Supersulphated Cement — Specification** (*Second Revision of* IS 6909) ICS 01.040.91

Kindly examine the attached draft and forward your views stating any difficulties which you are likely to experience in your business or profession, if this is finally adopted as National Standard.

Last Date for comments: 31 October 2024

Comments if any, may please be made in the enclosed format and emailed at ced2@bis.gov.in or sent at the above address. Additionally, comments may be sent online through the BIS e-governance portal, www.manakonline.in.

In case no comments are received or comments received are of editorial nature, kindly permit us to presume your approval for the above document as finalized. However, in case comments, technical in nature are received, then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

The document is also hosted on BIS website www.bis.gov.in.

Thanking you,

Yours faithfully,
Sd/-
Dwaipayan Bhadra
Scientist 'E' & Head
Civil Engineering Department

Encl: As above

FORMAT FOR SENDING COMMENTS ON THE DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Comments on each clause/sub-clause/ table/figure, etc, be stated on a fresh row. Information/comments should include reasons for comments, technical references and suggestions for modified wordings of the clause. Comments through e-mail to **ced2@bis.gov.in** shall be appreciated.]

Doc. No.: CED 02(26500)WC

BIS Letter Ref: CED 02:1/T-16

Title: Draft Indian Standard Supersulphated Cement — Specification (*Second Revision of* IS 6909) ICS No. 01.040.91

Last date of comments: 31 October 2024

Name of the Commentator/ Organization: _____

Sl No.	Clause/ Para/ Table/ Figure No. commented	Type of Comment (General/ Technical/ Editorial)	Comments/ Modified Wordings	Justification of Proposed Change

NOTE- *Kindly insert more rows as necessary for each clause/table, etc*

BUREAU OF INDIAN STANDARDS

DRAFT STANDARD FOR COMMENTS ONLY

(Not to be reproduced without the permission of BIS or used as an Indian Standard)

Draft Indian Standard

Supersulphated Cement — Specification

(Second Revision of IS 6909*)*

Cement and Concrete Sectional Committee, CED 02	**Last Date for Comments: 31 October 2024**

Foreword

(*Formal clauses of the standard to be added later*)

This standard was first published in 1973 and since then large number of amendments have been issued from time to time in order to modify various provisions based on the requirements of the users and also keeping in view the raw materials and fuel available in the country for manufacture of cement. The important amendments include incorporating a clause on false set of cement, permitting packaging of cement in 25 kg bags, making compulsory provision for issuing a certificate indicating the total chloride content in percent by mass of cement, modification in the tolerance requirements for the mass of cement packed in bags, etc. In view of these large number of amendments, the Sectional Committee decided to bring out the first revision of the standard incorporating all these amendments so as to make it convenient for the users.

Supersulphated cement has been successfully used in a variety of aggressive conditions, for example, for marine works, mass concrete jobs to resist the attack by aggressive water, reinforced concrete pipes in ground water, concrete construction in sulphate bearing soils, and in chemical works under conditions involving exposure to high concentrations of sulphates of weak solutions of mineral acids. It has been used for the underside of bridges over railways and for concrete sewers carrying industrial effluents. Its use under tropical conditions has also been recommended, provided the prevailing temperature is below 40°C *(see* Note). Although its use as a general purpose cement can be made with adequate precautions, it is not recommended for producing steam-cured products. Production of this cement will also result in greater utilization of blastfurnace slag, an industrial by-product of steel in the country.

NOTE - The limit of 40°C for use of this cement in tropical conditions is on the basis of available literature and this limit will be reviewed when more experience will be gained with the use of this cement in this country.

Mass of cement packed in bags and the tolerance requirements for the mass of cement packed in bags shall be in accordance with the relevant provisions of the *Standards of Weights and Measures (Packaged Commodities) Rules*, 1977 and **B-1.2**

(*see* Annex B for information). Any modification in these rules in respect of tolerance on mass of cement would apply automatically to this standard.

This standard contains **9.3** and **9.4** which call for agreement between purchaser and supplier.

This standard contributes to the United Nations Sustainable Development Goal 9: 'Industry, innovation and infrastructure', particularly its target to develop quality, reliable, sustainable and resilient infrastructure, and also promote inclusive and sustainable industrialization.

The composition of the Committee responsible for the formulation of this standard is given in Annex C.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall he rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

BUREAU OF INDIAN STANDARDS

DRAFT STANDARD FOR COMMENTS ONLY

Draft Indian Standard

Supersulphated Cement — Specification

(Second Revision of IS 6909)

1 SCOPE

1.1 This standard covers the requirements for composition, manufacture and testing of supersulphated cement.

2 REFERENCES

The standards given in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 4845 shall apply, in addition to the following.

3.1 Supersulphated Cement — A hydraulic cement produced by intergrinding or intimately blending a mixture of granulated blastfurnace slag, calcium sulphate and a small amount of Portland cement, Portland cement clinker or any other source of lime. The abbreviation ‘SSC’ shall be used for 'supersulphated cement'.

3.2 Calcium Sulphate — Calcium sulphate obtained by calcining high purity gypsum to convert it to anhydrite; calcination temperature may range from 500°C to 700°C. Naturally occurring anhydrite ($CaSO_4$) or industrial by-product anhydrite may also be used.

4 MANUFACTURE

4.1 Supersulphated cement shall be manufactured by intergrinding or intimately blending a mixture of granulated blast furnace slag, calcium sulphate and a small amount of 33 grade ordinary Portland cement, Portland clinker or any other source of lime *(see* Note). The dry granulated blast furnace slag component of the mixture shall not be less than 70 percent by mass. The cement shall be ground finer than 33 grade ordinary Portland cement and the technology of production shall ensure most intimate blending of its constituents.

NOTE — When produced by intimate blending, the various ingredients sought to be blended shall also have prior grinding to the fineness required.

4.2 An approved or established grinding aid may be used provided it is used in very small amounts in a manner similar to the grinding of clinker.

5 CHEMICAL REQUIREMENTS

5.1 The supersulphated cement shall comply with the following chemical requirements as given in Table 1 when tested in accordance with the methods given in IS 4032.

Table 1 Chemical Requirements
(*Clause* 5.1)

Sl No.	Characteristics	Requirement
(1)	(2)	(3)
a)	Insoluble residue, percent, *Max*	4
b)	Magnesium oxide, percent, *Max*	10
c)	Sulphuric anthydride, percent, *Min*	6
d)	Sulphide sulphur, percent, *Max*	1.5

NOTES

1 The limit of total chloride content in cement for use in plain and other reinforced concrete structures is being reviewed. Till that time, the limit may be mutually agreed to between the purchaser and the manufacturer. (Method of test for determination of chloride content in cement, is given in IS 12423).

2 Granulated slag conforming to IS 12089 has been found suitable for the manufacture of supersulphated cement.

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6 PHYSICAL REQIUIREMENTS

6.1 The supersulphated cement shall comply with the following physical requirements as given in Table 2.

Table 2 Physical Requirements
(*Clause* 6.1)

Sl No.	Characteristics	Requirement	Method of Test, Ref to
(1)	(2)	(3)	(4)
i)	Fineness, m^2/kg, *Min* (by Blaine's air permeability method)	400	IS 4031 (Part 2)
ii)	Setting Time: (*see* also Note 1)		IS 4031
	a) Initial, min, *Min*	30	(Part 5)
	b) Final, min, *Max*	600	
iii)	Soundness (By Le-Chatelier method), mm, *Max* (*see* Note 2)	5	IS 4031 (Part 3)
iv)	Compressive Strength: Average compressive strength of not less than 3 mortar cubes (area of face 50 cm^2), composed of 1 part supersulphate cement		IS 4031 (Part 6)

and 3 parts standard sand (as per IS 650) by mass **p/4* + 3.0 percent (of combined mass of cement plus sand) water, MPa, *Min (see* Notes 4 and 5)	
3 days	15
7 days	22
28 days	30

NOTES

1 If cement exhibits false set, the ratio of final penetration measured after 5 minutes of completion of mixing period to the initial penetration measured exactly after 20 seconds of completion of mixing period, expressed as percent, shall be less than 50 when tested according to the method described in IS 4031 (Part 14). In the event of cement exhibiting false set, the initial and final setting time of cement when tested by the method described in IS 4031 (Part 5) after breaking the false set, shall conform to the specified requirement.

2 The Le-Chatlier's method as described in IS 4031 (Part 3) is modified to omit the boiling test so that the initial reading is taken immediately after moulding and the final reading after immersion in water at 27°C ± 2°C for 24 hours shall comply to the requirement given above. The Le-Chatelier boiling test procedure and autoclave expansion are omitted since excessive unhydrated calcium oxide and periclase content are note envisaged.

3 '*p'* is the percentage of water required to produce a paste of standard consistency *(see* **11.3**).

4 By agreement between the purchaser and the manufacturer, transverse strength test of plastic mortar in accordance with the method described in IS 4031 (Part 8) may be specified in addition to the compressive strength test**.** The permissible values of the transverse strength for supersulphated cement shall be mutually agreed to between the purchaser and supplier at the time of placing order.

5 Notwithstanding the compressive and transverse strength requirements, supersulphated cement shall show at 168 hours and 672 hours a progressive increase in strength from the strength at 72 hours.

7 STORAGE

The supersulphated cement shall be stored in such a manner as to permit easy access for inspection and in a suitable weather-tight building to protect the cement and clinker component from hydration and to minimize warehouse deterioration (*see also* IS 4082).

8 MANUFACTURER'S CERTIFICATE

The manufacturer shall satisfy himself that the cement conforms to the requirements of this standard, and if requested, shall furnish a certificate to this effect to the purchaser or his representative, within ten days of despatch of cement, indicating the total chloride content in percent by mass of cement.

9 PACKING

9.1 The cement shall be packed in any of the following bags:

a) Multi-wall paper sacks conforming to IS 11761,

b) HDPE/PP woven sacks conforming to IS 11652,
c) Jute synthetic union bags conforming to IS 12174, or
d) Any other approved composite bag.

Bags shall be in good condition at the time of inspection.

9.2 The net quantity of cement per bag shall be 50 kg subject to provisions and tolerance given in Annex B.

NOTE — Since the specific gravity (2.80 to 2.90) and the bulk density (1.3 kg/l) of supersulphated cement are lower than those of ordinary Portland cement, the size of the bag for 50 kg supersulphated cement will be somewhat larger compared to the size of conventional bag for ordinary Portland cement.

9.2.1 The net quantity of cement per bag may also be 25 kg subject to tolerances as given in **9.2.1.1** and packed in suitable bags as agreed to between the purchaser and the manufacturer.

9.2.1.1 The number of bags in a sample taken for weighment showing a minus error greater than 2 percent of the specified net quantity shall be not more than 5 percent of the bags in the sample. Also the minus error in none of such bags in the sample shall exceed 4 percent of the specified net quantity of cement in the bag. However, the net quantity of cement in a sample shall be equal to or more than 25 kg.

9.2.2 When cement is intended for export and if the purchaser so requires, packing of cement may be done in bags or in drums with net quantity of cement per bag or drum as agreed to between the purchaser and the manufacturer.

9.2.2.1 For this purpose the permission of the certifying authority shall be obtained in advance for each export order.

9.2.2.2 The words 'FOR EXPORT' and the net quantity of cement per bag/drum shall be clearly marked in indelible ink on each bag/drum.

9.2.2.3 The packing material shall be as agreed to between the manufacturer and the purchaser.

9.2.2.4 The tolerance requirements for the mass of cement packed in bags/drum shall be as given in **9.2.1.1** except the net quantity which shall be equal to or more than the quantity in '**9.2.2**.'

9.3 Supplies of cement in bulk may be made by agreement between the purchaser and the supplier (manufacturer or stockist).

NOTE — A single bag or container containing 1 000 kg or more net quantity of cement shall be considered as bulk supply of cement. Supplies of cement may also be made in intermediate containers, for example, drums of 200 kg, by agreement between the purchaser and the manufacturer.

10 SAMPLING

10.1 A sample or samples for testing may be taken by the purchaser or his representative, or by any person appointed to superintend the work for the purpose for which the supersulphated cement is required, or by the latter's representative.

The samples shall be taken within three weeks of delivery and the tests shall be commenced within four weeks of delivery.

10.2 Notwithstanding the requirements of **10.1**, the methods and procedure of sampling shall be in accordance with IS 3535.

10.3 The manufacturer or supplier shall afford every facility, and shall provide all labour and materials for taking and packing the samples for testing the supersulphated cement and for subsequent identification of the cement sampled.

11 TESTS

11.1 The sample or samples of cement for tests shall be taken as described in **10.1** and **10.2** and shall be tested in the manner prescribed in the relevant clauses.

11.2 The temperature at which physical tests are carried out should, as far as possible, be 27° C ± 2°C.

11.3 The quantity of water required to produce a paste of standard consistency, to be used for the determination of the water content of mortar for the compressive strength tests and for the determination of soundness and setting time, shall be obtained by the method described in IS 4031 (Part 4).

11.4 Any cement which does not comply with any of the tests and analysis specified in this standard or which has not been stored in the manner provided under **7.1** may be rejected as not complying with this standard.

11.5 Independent Testing

11.5.1 If the purchaser or his representative requires independent tests, the samples shall be taken before or immediately after delivery at the option of the purchaser or his representative, and the tests shall be carried out in accordance with this standard on the written instructions of the purchaser or his representative.

11.5.2 Cost of Testing

The manufacturer shall supply, free of charge, the supersulphated cement required for testing. Unless otherwise specified in the enquiry and order, the cost of the tests shall be borne as follows:

a) By the manufacturer in the event of the results showing that the cement does not comply with this standard, and
b) By the purchaser in the event of the results showing that the cement complies with this standard.

11.5.3 After a representative sample has been drawn and hermetically sealed, tests on the sample shall be carried out as expeditiously as possible.

12 MARKING

12.1 Each bag or drum of cement shall be legibly and indelibly marked with the following:

a) Manufacturer's name and his registered trade-mark, if any;
b) The words 'SUPERSULPHATED CEMENT';
c) Net quantity, in kg;
d) The words 'USE NO HOOKS' on the bags;
e) Batch/control unit number in terms of week, month and year of packing;
f) Best before date (that is, 3 months from date of packing);
g) The need for testing of cement more than 3 months old to check conformity before its use; and
h) Address of the manufacturer.

12.2 Similar information shall be provided in the delivery advices accompanying the shipment of packed or bulk cement and on cement drums (*see* **9.3**).

12.3 BIS Certification Marking

12.3.1 The cement may also be marked with the Standard Mark.

12.3.2 The use of the Standard Mark is governed by the provisions of *the Bureau of Indian Standards Act,* 2016 and the Rules and Regulations made thereunder. The details of conditions under which a license for the use of the Standard Mark may be granted to manufacturers or purchasers may be obtained from the Bureau of Indian Standards.

13 REJECTION

13.1 Cement may be rejected, if it does not comply with any of the requirements of this specification.

13.2 Cement remaining in bulk storage at the factory, prior to shipment, for more than six months, or cement in bags, in local storage such as in the hands of a vendor for more than 3 months after completion of tests, shall be retested before use and shall be rejected, if it fails to conform to any of the requirements of this specification.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
IS 650 : 1991	Standard sand for testing cement - Specification (Second Revision)
IS 3535 : 1986	Methods of Sampling Hydraulic Cement (First revision)
IS 4031	Methods of physical tests for hydraulic cement:
Part 1:1996	Determination of fineness by dry sieving (*second revision)*
Part 2:1999	Determination of fineness by Blaine air permeability method (*second revision)*
Part 3:1988	Determination of soundness (*first revision*)
Part 4:1988	Determination of consistency of standard cement paste (*first revision*)
Part 5:1988	Determination of initial and final setting times (*first revision*)
Part 6:1988	Determination of compressive strength of hydraulic cement other than masonry cement (*first revision*)
Part 7:1988	Determination of compressive strength of masonry cement (*first revision*)
Part 8:1988	Determination of transverse and compressive strength of plastic mortar using prism (*first revision*)
Part 9:1988	Determination of heat of hydration (*first revision*)
Part 10:1988	Determination of drying shrinkage (*first revision*)
Part 11:1988	Determination of density (*first revision*)
Part 12:1988	Determination of air content of hydraulic cement mortar (*first revision*)
Part 13:1988	Measurement of water retentivity of masonry cement (*first revision*)
Part 14:1989	Determination of false set (*first revision*)
IS 4032:1985	Method of chemical analysis of hydraulic cement (first revision)
IS 4845:1958	Definitions and Terminology relating to Hydraulic Cement
IS 4905 : 2015	Random sampling and randomization procedures (First Revision)
IS 11652 : 2017	Textiles — High Density Polyethylene (HDPE)/Polypropylene (PP) Woven Sacks for Packaging of 50 kg Cement — Specification (*Third Revision*)
IS 11761 : 1997	Multi-Wall paper sacks for cement - Specification (First Revision)

IS 12089 : 1987	Specification for granulated slag for the manufacture portland slag cement
IS 12174 : 1987	Specification for jute synthetic union bags for packing cement
IS 12423 : 1988	Method for colorimetric analysis of hydraulic cement

ANNEX B

(Clause 9.2)

TOLERANCE REQUIREMENTS FOR THE QUANTITY OF CEMENT PACKED IN BAGS

B-1 The net quantity of cement packed in bags at the plant in a sample shall be equal to or more than 50 kg. The number of bags in a sample shall be as given below:

Batch Size	*Sample Size*
100 to 150	20
151 to 280	32
281 to 500	50
501 to 1 200	80
1 201 to 3 200	125
3 201 and over	200

The bags in a sample shall be selected at random (*see* IS 4905).

B-1.1 The number of bags in a sample showing a minus error greater than 2 percent of the specified net quantity (50 kg) shall be not more than 5 percent of the bags in the sample. Also the minus error in none of such bags in the sample shall exceed 4 percent of the specified net quantity of cement in the bag.

NOTE — The matter given in **B-1** and **B-1.1** are extracts based on the *Standards of Weights and Measures (Packaged Commodities) Rules,* 2011 to which reference shall be made for full details. Any modification made in these Rules and other related Acts and Rules would apply automatically.

B-1.2 In case of a wagon/truck load up to 25 tonnes, the overall tolerance on net quantity of cement shall be 0 to +0.5 percent.

ANNEX C

(*Foreword)*

(Committee composition will be added after finalization)

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